

## Atmospheric Excitation of Nutation

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The luni-solar gravitational potential acts upon the solid Earth causing it to nutate and precess. Within a celestial, space-fixed reference frame these notational and precessional motions of the solid Earth occur at periods associated with the orbital motions of the Earth and Moon (fortnightly, monthly, semi-annual, annual, etc.). When viewed from within a terrestrial, body-fixed reference frame that has been attached in some prescribed manner to the solid Earth, these notational and precessional motions of the solid Earth appear at retrograde nearly diurnal frequencies [the relationship between the celestial frequency  $\sigma_c$  of some nutation and its terrestrial frequency  $\sigma_t$  is simply given by  $\sigma_c = \sigma_t + \Omega$  where  $\Omega \equiv 1$  cycle per sidereal day (cpsd)]. Therefore, nearly diurnal changes in atmospheric wind and pressure have the potential to excite notational motions of the solid Earth through the exchange of angular momentum between the atmosphere and solid Earth. In this presentation, the available series of subdaily determinations of atmospheric angular momentum will be analyzed in order to study the atmospheric excitation of nutation.

Since mid- 1992, determinations of atmospheric angular momentum (AAM) excitation functions at 6-hour intervals have been available from the analysis models of (1) the US National Meteorological Center, (2) the European Centre for Medium-Range Weather Forecasts, and (3) the Japan Meteorological Agency. In addition, AAM excitation functions at 6-hour intervals have been computed by us from observations of atmospheric wind and pressure taken during the First Global GARP Experiment (FGGE, aka the Global Weather Experiment) which was conducted in 1979. The x- and y-components (the components that excite polar motion or, equivalently, nutation) of these various excitation series will be compared and contrasted as a means of assessing the reliability of the diurnal variations evident in them. These excitation functions will then be convolved with the Earth's impulse response (using a formulation of it that is resonant at both the Chandler and free core nutation frequencies) in order to predict the effect on the nutations of the diurnal atmospheric wind and pressure variations.